

Attorney Docket No. P28961

Application No. 10/560,077

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Shintaro KOBAYASHI et al.

**Confirmation No. 1087**

Appln. No. : 10/560,077

Group Art Unit: 4181

(U.S. National Stage of PCT/JP2004/008364)

I.A. Filed : June 9, 2004

Examiner: Syed IQBAL

For : ADSORBENT, ADSORPTION APPARATUS, AND METHOD FOR  
MANUFACTURING THE ADSORPTION APPARATUS

**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Service Window, Mail Stop After Final  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

Responsive to the final Office Action mailed April 6, 2010 and to the Advisory Action mailed August 25, Applicants respectfully request reconsideration and withdrawal of the rejections of record in view of the following amendments and remarks. Inasmuch as the Office Action sets a three-month shortened statutory period for response to expire on July 6, 2010, this response is filed concurrently with a Request for Two-Month Extension of Time and the requisite fee (for two months extension minus one month extension previously paid). If any additional extension of time is necessary the same is hereby requested and if any fees are necessary to maintain the pendency of this application, including any additional extension and/or claim fee, the Office is authorized to charge such fee to Deposit Account No. 19-0089.

**Remarks** begin on page 2 of this paper.

**Remarks**

The Action rejects claims 3, 6, 7, 9, 10, 13-15, and 18 under 35 U.S.C. § 103 as allegedly unpatentable over Atsumi et al. (JP 10-118167) in view of Ichitsuka et al. (U.S. Patent No. 5,651,884). The Action also rejects the same claims over Ichitsuka et al. in view of Atsumi. Applicants request review of the rejections for the reasons that follow.

The Final Action relies on Atsumi et al. for its teaching of combining a slurry of an apatite compound with a source of trivalent iron, so that the iron will bind to the phosphate of the apatite in the slurry. Noting that the present claims recite preparing a column by filling its space with apatite and then passing a solution containing  $Fe^{3+}$  over the column, and that Atsumi et al. fails to teach that process, the Action relies on Ichitsuka et al. for its teaching of columns filled with apatite compounds. The Action essentially asserts that it would be obvious to replace Atsumi et al.'s slurry process by loading Ichitsuka et al.'s column with Atsumi et al.'s apatite and flowing a source of trivalent iron over the column, with an expectation of achieving the same result as Atsumi et al.

Applicants note that Atsumi et al. uses the ion-exchanged hydroxyapatite for absorption of odors. A very high surface area is important – following formation of the above-noted slurry, Atsumi et al. pulverizes the ion-exchanged hydroxyapatite to obtain the deodorizing agent. A particular crystalline structure or porous quality of the end product is not particularly important, as evidenced by the fact that Atsumi et al. pulverizes the end product to obtain the deodorizing agent.

The Final Action asserts that it would have been obvious to combine the teachings of Atsumi et al. with Ichitsuka et al., so as to perform the slurry step of Atsumi et al. in a column according to Ichitsuka et al. Applicants respectfully submit that this would not have been obvious, as Atsumi et al.'s end product requires drying and pulverization. It would have been useless for Atsumi et al.'s end use while in the column, and thus, would have required removal from the column itself for drying and pulverization. Additionally, Applicants note that persons

skilled in the art would understand how difficult it would be to remove wet, packed, column material from a column. Similarly, drying the ion-exchanged hydroxyapatite in the column and then removing the dried hydroxyapatite (prior to pulverizing) would also likely yield limited success. Applicants respectfully submit that, given Atsumi et al.'s desired end use and steps of drying and pulverizing the product, it would be illogical to use a process other than a slurry to obtain the end product. And performing the reaction in a column would only have added time and effort. Applicants submit that a person skilled in the art would not have combined Atsumi et al. with Ichitsuka et al. for at least this reason.

Applicants further note that the expectation of achieving the same result with the column as in the slurry is *critical* to maintaining the rejection, as the Office Action fails to provide any alternative basis for making the replacement. However, it is on this expectation of similar results that the Office is mistaken. In this regard, Applicants respectfully direct the Office's attention to Wakamura et al., *Colloids and Surfaces* 164: 297-305 (2000), which was provided in the IDS filed April 23, 2008. Wakamura et al. specifically studied the exchange of calcium in calcium-containing apatite for trivalent iron (among other metals), and found that the method of performing the exchange (and the particular metal ion) has profound effects on whether exchange occurs. For example, Wakamura et al. states that “[calcium-apatite] substituted with Fe(III) by the coprecipitation method had one kind of surface Fe-OH, but those by the *immersion method* had no surface Fe-OH. The exchange mechanism with metal ions depends on the substituting method and kinds of metal ions.” (Page 304, Conclusions, emphasis added.)

Applicants note that Atsumi et al. discloses that a slurry of an apatite is added to a solution containing  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  as a metallic salt. That is, the apatite is *immersed* into the solution to thereby obtain an adsorbent comprising the apatite with  $\text{Fe}^{3+}$ . (See paragraphs 0055 and 0056 of Atsumi et al.). Applicants respectfully submit that what is occurring in Atsumi et al. is an exchange of  $\text{Ca}^{2+}$  for  $\text{Fe}^{3+}$  *within* the apatite, not on its surface. This conclusion is supported by the fact that Atsumi et al. discloses that  $\text{Ca}^{2+}$  contained in the apatite is easily ion-exchanged and the ratio between  $\text{Ca}^{2+}$  and  $\text{PO}_4^{3-}$  contained in the apatite is changed, depending

on the kinds and/or amounts of metal elements to be carried. (See paragraphs 0030 and 0031 of Atsumi et al.) This conclusion is also supported by Wakamura et al., which found no surface Fe-OH with immersion.

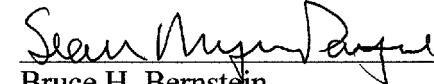
Applicants further note that this difference in the end product between what is obtained by Atsumi et al.'s method and the present method is particularly germane to obviousness. That is, because Atsumi et al. produced a product that differed structurally from that produced by the present method – and in fact, could not have produced the same product obtained by the present method – Atsumi et al. would not have sought modifications or optimizations that would result in a particular surface structure. In other words, Atsumi et al. could not have recognized that a particular form, particle size, or flow rate might affect the surface structure of the apatite. Thus, the Office's assertion that "it would be obvious to one having an ordinary level of skill in the art to perform routine experimentation to find a suitable or optimal value for parameters such as the particle size and Fe flow rate" (page 3, second full paragraph) clearly lacks foundation.

In response to the Office's assertion (in the Final Action) that "there is no evidence of record for the contention of unexpected results emanating from using the flow rate in combination [with] particle size" (page 4, first paragraph), Applicants note that this is based upon a fundamentally flawed view of the technology. The Office fails to see that the results are unexpected because it fails to appreciate that Atsumi et al. could not have produced the present results. Once it is understood that Atsumi et al. could not have led to the composition achieved by the present invention, one must conclude that the results are unexpected in view of Atsumi et al. and Ichitsuka et al.

In view of the foregoing remarks, Applicants respectfully submit that the combination of Atsumi et al. and Ichitsuka et al. (in any proper manner) fails to establish a *prima facie* case of obviousness. Applicants respectfully request withdrawal of the rejection.

If any issues yet remain which can be resolved by telephone, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,  
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September 7, 2010  
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